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CLAIMS:

What is claimed is:

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1. A thermoelectric device, comprising:

a first thermoelement constructed from a first type of thermoelectric material;

10 a second thermoelement, constructed from a second type of thermoelectric material, electrically coupled to the first thermoelement;

an array of first tips proximate to the first thermoelement at a first set of discrete points such that electrical conduction between the array of first tips and the first thermoelement is facilitated but thermal
15 conduction between the array of first tips and the first thermoelement is retarded; and

an array of second tips proximate to the second thermoelement at a second set of discrete points such
20 that electrical conduction between the array of second tips and the second thermoelement is facilitated while thermal conduction between the array of second tips and the second thermoelement is retarded; wherein

the first and second tips are constructed from
25 metal.

2. The thermoelectric device as recited in claim 1, wherein the metal is copper.

30 3. The thermoelectric device as recited in claim 1, wherein the metal is a first metal and further

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comprising:

a second layer of metal overcoating each of the first and second conical tips.

5 4. The thermoelectric device as recited in claim 3, wherein the second layer of metal comprises nickel.

5. The thermoelectric device as recited in claim 1, further comprising:

10 layers of thermoelectric material overcoating each of the first and second conical tips, wherein the thermoelectric material layer impurity type match the respective impurity types of the proximate the first and second thermoelements.

15 6. The thermoelectric device as recited in claim 1, wherein the first and second thermoelements each comprise a first and a second superlattice of thermoelectric material respectively.

20 7. The thermoelectric device as recited in claim 1, wherein the first and second tips are substantially conical.

25 8. The thermoelectric device as recited in claim 1, wherein the first and second tips are substantially pyramidically shaped.

30 9. A method of forming all metal tips for use in a thermoelectric device, the method comprising:
fabricating a planar sacrificial template with a

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Fig. 6

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pitted surface having multiple valleys of consistent depth;

covering the sacrificial template with a layer of metal extending into the valleys of the sacrificial

5 template; and

removing the sacrificial template to create a layer of metal with multiple tips.

10. The method as recited in claim 9, wherein the tips
10 are conical in shape.

11. The method as recited in claim 9, wherein the tips are pyramid in shape.

15 12. A method of forming metal pointed tips for use in a thermoelectric device, the method comprising:

forming a mask of patterned photoresist onto a layer of metal;

20 etching the layer of metal in the presence of the photoresist mask to produce substantially pointed tipped structures of metal; and

removing the photoresist.

13. The method as recited in claim 12, wherein the
25 patterned photoresist forms an array of photoresist areas that correspond to areas for which tips of the substantially pointed tipped structures of metal are desired.

30 14. The method as recited in claim 12, wherein the metal is copper.

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FIG. 6

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15. The method as recited in claim 12, further comprising:

coating the substantially pointed tipped structures
5 of metal with a layer of a second metal.

16. The method as recited in claim 12, further comprising:

coating the substantially pointed tipped structures
10 of metal with a layer of thermoelectric material.

17. The method as recited in claim 15, further comprising:

coating the layer of second metal with a layer of
15 thermoelectric material.

18. The method as recited in claim 12, wherein the substantially pointed tipped structures are conical shaped.

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19. The method as recited in claim 12, wherein the substantially pointed tipped structures are pyramid shaped.

25 20. A system of forming metal pointed tips for use in a thermoelectric device, the system comprising:

means for forming a mask of patterned photoresist onto a layer of metal;

means for etching the layer of metal in the presence
30 of the photoresist mask to produce substantially pointed tipped structures of metal; and

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means for removing the photoresist.

21. The system as recited in claim 20, wherein the patterned photoresist forms an array of photoresist areas
5 that correspond to areas for which tips of the substantially pointed tipped structures of metal are desired.

22. The system as recited in claim 20, wherein the metal
10 is copper.

23. the system as recited in claim 20, further comprising:
means for coating the substantially pointed tipped
15 structures of metal with a layer of a second metal.

24. The system as recited in claim 20, further comprising:
means for coating the substantially pointed tipped
20 structures of metal with a layer of thermoelectric material.

25. The system as recited in claim 23, further comprising:
25 means for coating the layer of second metal with a layer of thermoelectric material.

26. The system as recited in claim 20, wherein the substantially pointed tipped structures are conical
30 shaped.

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27. The system as recited in claim 20, wherein the substantially pointed tipped structures are pyramid shaped.

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